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CERTIFICATE

This certificate is issued in support of an application for Patent registration in a country outside New Zealand pursuant to the Patents Act 1953 and the Regulations thereunder.

I hereby certify that annexed is a true copy of the Provisional Specification as filed on 17 September 2003 with an application for Letters Patent number 528173 made by John Joseph MacCarron.

I further certify that the Provisional Specification has since been post-dated to 17 November 2003 under Section 12(3) of the Patents Act 1953.

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Dated 13 December 2004.

Neville Harris

Neville Harris
Commissioner of Patents, Trade Marks and Designs

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PATENTS ACT 1953

PROVISIONAL SPECIFICATION

Simulator for board sports

I, **John Joseph MacCarron**, a British citizen of 30 Jackson St, Methven, New Zealand, do hereby declare this invention to be described in the following statement:

Simulator for board sports

TECHNICAL FIELD

The invention relates to a simulator for board sports. In particular the invention relates to a simulator able to be used both for determining a rider's stance and also as a training aid.

BACKGROUND ART

In recent years, there has been great growth in board sports such as snowboarding, kite surfing, motorised skateboarding etc. As in other sports where an object is manipulated by a person the person aims to approach an optimal course of movement of his body and the object. This optimal movement would allow a minimal effort to result in a maximal effect such as, for example, a maximal weight transfer onto an edge when riding a snowboard. In board sports where the rider's feet and lower legs are to a degree fixed relative to a board or platform then it is generally considered that correct stance is necessary to approach this optimal movement.

Although an incorrect or sub-optimal stance can be employed, such a stance imposes an additional burden upon a beginner during the strenuous and potentially expensive learning phase. This burden could be reduced if a better stance had been adopted initially. At worst, a rider may be so unsuited to a stance that it poses a heightened risk of possible injury.

As beginners are often fully pre-occupied with mastering numerous skills, the subtle effects of stance changes are often completely overlooked. Consequently, a rider may retain a particular stance setting provided on their first board for a considerable time, without experimentation. This makes beginners reluctant to vary their stance before they have gained a greater degree of ability.

Riders are further discouraged in experimenting with variations in stance because of the difficulty in making meaningful assessments of the adjustments to the equipment, Attempting to compare the results of different settings between runs is fraught with variables outside the rider's control.

A board rider's stance can be varied in a number of ways. A typical snowboard, for example, has two longitudinally spaced boot bindings that support both feet, often at a substantial angle with respect to the longitudinal centreline of the snowboard. This cross-orientation of the bindings allows the rider to assume a side-forward stance, which is the necessary anatomical positioning for optimal in-use control of the snowboard.

It is often the case that either a boot worn by the rider or the binding itself will be provided with a support for the lower leg with a variable degree of forward lean. Stance can also be varied by adjusting the angle between the midline of the foot and the centreline of the snowboard and this is often significantly altered for different snowboarding styles, e.g. freestyle or slalom racing. However, when the angle of the midline of the foot with respect to the board is changed, this can also change the angle of forward lean. Other degrees of freedom are also available, however within these restraints the "ideal" stance may be optimally adapted to the anatomical measurements and dynamic qualities of the rider.

Mechanical surfboards help a surfer learn-balance and dynamically determine the effect of adjustments on the width ~~of his stan~~ce on his ability to balance, however they do not allow the simulation of board sports, such as snowboarding, where the rider's feet are fixed relative to the board. Snowboard simulating devices which a rider can use on a trampoline allow the simulation of dynamic conditions with feet fixed to a platform, however they provide no means to determine the effect of adjustments of the rider's stance.

It would be desirable to provide a device for determining a rider's stance for board sports and which addresses the above-mentioned disadvantages.

Training devices such as the above-mentioned mechanical surfboards and snowboard simulating devices have been produced to assist beginners in learning the movements involved in various board sports. However, typically snowboard training is undertaken on ski fields in formal lessons and/or through self-teaching. The learning phase of snowboarding can be very strenuous and traumatic to many novices due to the inevitable falls incurred. Many individuals become disenchanted and give up the sport at this stage. Therefore, a relatively accessible and safe means of practising the movements involved in rider will enhance the learning phase as well as benefiting experienced riders. Learning typically proceeds by a combination of observation of a trainer and trial and error, and it is advantageous for both the leisure industry and the health of the learner to make training as effective and efficient as possible.

Therefore, it would also be desirable to make available a training device which addresses the above-mentioned disadvantages and which makes possible an improved and cost-effective training in a course of movement for board sports.

It is an object of the present invention to address the foregoing problems or at least to provide the public with a useful choice.

Further aspects and advantages of the present invention will become apparent from the ensuing description which is given by way of example only.

DISCLOSURE OF THE INVENTION

According to one aspect of the present invention there is provided a simulator for board sports including:

a pair of foot mounts for holding a rider's feet;

a pivotal attachment for pivoting the foot mounts about a first simulator axis to simulate pivoting movement of a board,

and characterised in that

means are provided for adjusting the spacing between the foot mounts while the rider's feet are held by the foot mounts.

The simulator allows a rider to simulate at least one pivoting movement that is made to manoeuvre a snowboard. The rider is thereby able to dynamically determine the effect of adjustments on the width of his stance (determined by the spacing between the foot mounts) on his ability to balance about the first simulator axis.

In the preferred embodiment the pivoting of the foot mounts about the first simulator axis is adapted to simulate roll movement of a board about its longitudinal or roll axis and the spacing between the foot mounts is adjustable in a direction substantially parallel to the first simulator axis. It will be understood that pivoting about the longitudinal or roll axis of a board is important in steering the board to transfer weight between the opposing longitudinal edges of the board.

Optionally the simulator may be adapted for simulating pivoting or rotation about a pitch axis and/or about a yaw axis of the board. In addition to pivoting about the first simulator axis therefore, the simulator may include means for pivoting the foot mounts about mutually orthogonal pitch and yaw axes, both of which are perpendicular to the first simulator axis.

Advantageously the foot mounts are fixed together for pivoting about the first simulator axis. The foot mounts may be fixed to a platform for simulating a snowboard, or the like. Most preferably, for simulating the manner of mounting foot mounts on a snowboard, the foot mounts include boot bindings. A support is fixed to

the pivotal attachment for supporting the foot mounts, preferably upon the ground. A handle may be fixed to the support to assist the rider and prevent a fall.

The pivotal attachment is preferably configured such that the first simulator axis is below the foot mounts. The pivotal attachment preferably includes resilient means to provide the pivoting movement about the simulator axis while also tending to bias the platform toward the horizontal plane. The resilient means, for example, may include an elastomeric block fixed between the platform and the support. Alternatively, the pivotal attachment may include a journal and separate resilient means.

Optionally one or both foot mounts are fixed in a track extending parallel to the first simulator axis for movement to adjust the spacing between the foot mounts. The means for adjusting the spacing between the foot mounts is preferably a screw-type adjuster, but it will be understood that other manually or power-operated linear actuators may also be used. The means for adjusting the spacing between the foot mounts is preferably adapted to allow for adjustment while the rider is held in the foot mounts.

The simulator may further include means for measuring the spacing between the centres of the foot mounts, such as a ruler. An indicating device, such as a plumb line or level, may also be provided to assist in aligning the centre of the rider's knee vertically with his foot. The indicating device may be fixed to the support to remain upright when moved to be aligned with the rider's knee e.g. by a slider in a track or by means of a parallel arm type linkage. Alternatively, the indicating device may conveniently be a narrow rod assembly fixed to the binding or platform, extending generally perpendicular to a base of the binding or platform and able to telescope to align with the knees of different height users.

In addition to this freedom of adjustment of the foot mounts in the longitudinal direction, the simulator preferably includes means for adjustment of the foot mounts

by rotation of each foot mount about an axis normal to the first simulator axis for adjusting the angle between the midline of the foot and the first simulator axis. The simulator preferably includes means for adjustment of the angle of forward lean of a leg support portion of each foot mount, where the angle of forward lean is measured between the midline of the foot and the midline of the lower leg.

Means may also be provided for movement of the foot mounts lateral to the first simulator axis. The means for means for providing each of these adjustments is preferably adapted to allow for adjustment while the rider is held in the foot mounts e.g. by a separate operator or by remote control means operated by the rider.

In a preferred embodiment both foot mounts are adapted to be simultaneously moved for adjusting the spacing between the foot mounts in a direction substantially parallel to the first simulator axis. This may be achieved, for example, by a screw-type adjuster, manually or power-operated linear actuators etc. Also, means may be provided for inclining the platform e.g. for raising or lowering one of the foot mounts with regard to the other to simulate downhill (or uphill) riding. This may be achieved using a screw-type adjuster, manually or power-operated linear actuators.

This invention provides a simulator which is effective and efficient in operational use, and which is versatile in operation, allowing it to be used to assist board riders determine their stance and also for training riders in different courses of movement. The simulator may be economically constructed and has an overall simple design which minimizes manufacturing costs.

BRIEF DESCRIPTION OF THE DRAWINGS

Further aspects of the present invention will become apparent from the following description which is given by way of example only and with reference to the

accompanying drawings in which:

Figure 1 is a perspective view of a rider 1 on the simulator of the present invention;

Figure 2 is a side view of the simulator of Fig. 1, and

Figure 3 is a cut-away plan view of the simulator of Fig. 1.

BEST MODES FOR CARRYING OUT THE INVENTION

Referring to Figure 1, a simulator 100 according to the present invention for board sports, and in particular snowboarding, is shown with a rider 1 having his feet engaged in a pair of foot mounts or boot bindings 2, 2' in the simulator 100.

Pivotal attachment comprising front and rear pivots 3 and 3' are mounted on a ground-engaging support 4. The boot bindings 2, 2' are fixed upon a platform 5 supporting the rider 1 for pivoting movement about a first simulator axis A defined by the pivots 3 and 3' to simulate pivoting movement of a snowboard about its longitudinal centreline B. It will be understood that the axes A and B are parallel and offset vertically in the embodiment shown.

To assist the rider 1, a handle 14 is provided, fixed to the support 4. In addition, stops 15 are fixed on the support 4 on opposing sides of the axis A for abutting the underside of the platform 5 to limit the degree of pivoting movement.

Mounting and support for the rider's booted feet and the lower legs is provided by each individual binding 2, 2'. The boot binding 2' is mounted in a pair of rails 5 aligned with the axis A, for adjusting the longitudinal spacing between the bindings 2, 2'. The centre line of each of the rider's feet, i.e., a line from the heel to the toe, is situated at an angle to the axis A. It can also be seen generally that, at each of the rider's ankles,

the angle of forward lean measured between the lower leg and the foot is somewhat different with each leg, partially due to the spread of the feet and also the varied angle of the feet with respect to the axis A.

As seen in Figs. 2 and 3, a screw threaded rod 6 and handle 7 are fixed for moving the binding 2'. The rod 6 is received in a threaded part (not shown) fixed to a mounting 8. The mounting 8 is a flat rectangular plate received between the rails 5 and to which the binding 2' is fixed. This arrangement allows an operator to adjust the spacing between the bindings 2, 2' in a direction parallel to the axis A. A ruler (not shown) or other means is provided to allow the operator to measure the longitudinal spacing between the centres of the bindings 2, 2'.

The pivots 3 and 3' include resilient means, such as an elastomeric element 13, which deflects to provide the pivoting movement about the axis A while also tending to bias the platform 5 toward the horizontal plane.

The base binding discs 9, 9' that are mounted to the top of the platform 5 and the plate 8 respectively have their centres aligned with the axis A. The bindings 2, 2' are fixed by the discs 9 for rotation about respective axes C, D perpendicular to axis A for adjusting the angle between the midline of the foot and the centreline of the snowboard. A scale 10 provided on the discs 9, 9' allows the angular measurement to be determined. Preferably detents (not shown) allow ready incremental adjustment. No stops limit the rotational movement of the bindings 2, 2', which can rotate through 360 degrees.

Mounted to the rear of each binding 2, 2' is a high back leg support 12 which is adjustable for rotation about respective axes E and F normal to the axes C and D to provide a variable degree of forward lean. The high back leg support 12 may be rotated and locked in position, in the known manner.

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As described above, the structure of these various components of the simulator allows for freedom of adjustment of the bindings 2, 2' in the longitudinal direction, rotation about an axis normal to the platform 5, and rotation of the high back leg support 12 toward the platform 5 and about an axis normal to the platform 5. In addition, means may be provided (not shown) for movement of the bindings 2, 2' lateral to the centre line B of the board. Also, a vertical indicating device (not shown) such as a level or vertical rod or the like is provided to assist in aligning the centre of the rider's knee K with his foot.

In use a rider is secured to the simulator 100 by the bindings 2, 2' in an initial narrow stance, where the bindings 2, 2' are relatively close together in the longitudinal direction. With support initially from the handle 14 the rider 1 attempts to balance the platform 5, maintaining it horizontal, while the operator slowly moves the binding 2' to widen the stance. As the stance is widened, the rider is able to feel a point at which he can balance the platform. This "correct" stance can be verified by use of the vertical indicating device to align the centre of the rider's knee with the centre of his foot. This same process can be repeated with variations in the other adjustments described above to determine a comfortable stance, approaching an optimal, which is suited to the anatomical measures and dynamic qualities of the rider. It will also be understood that the simulator allows for improved training, allowing a rider to practice courses of movement, and, for example, to allow a trainer to make ready observations to assist the learning process.

Aspects of the present invention have been described by way of example only and it should be appreciated that modifications and additions may be made thereto without departing from the scope thereof.

John Joseph MacCarron
by his Attorneys

JAMES & WELLS

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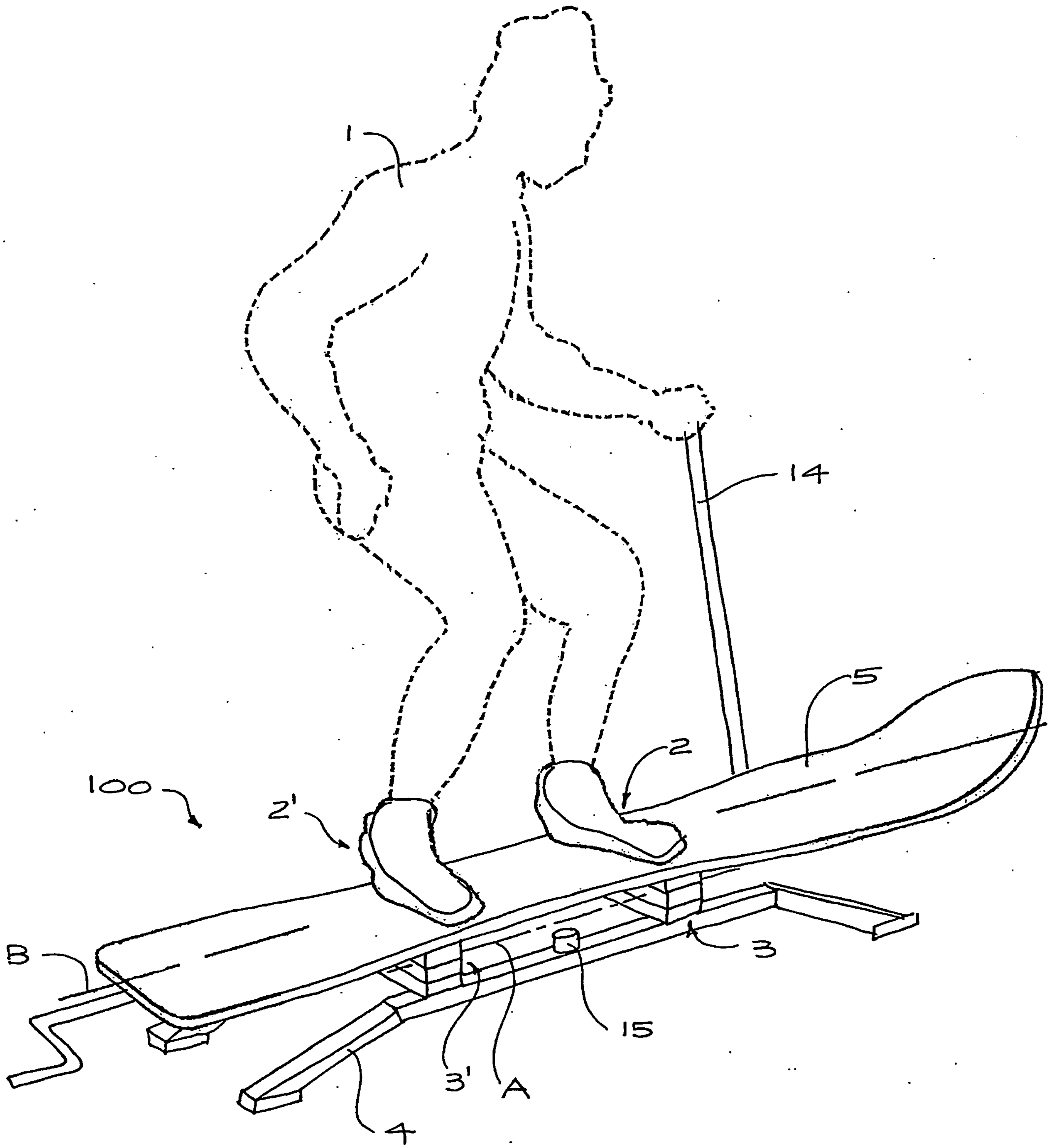

FIG. 1

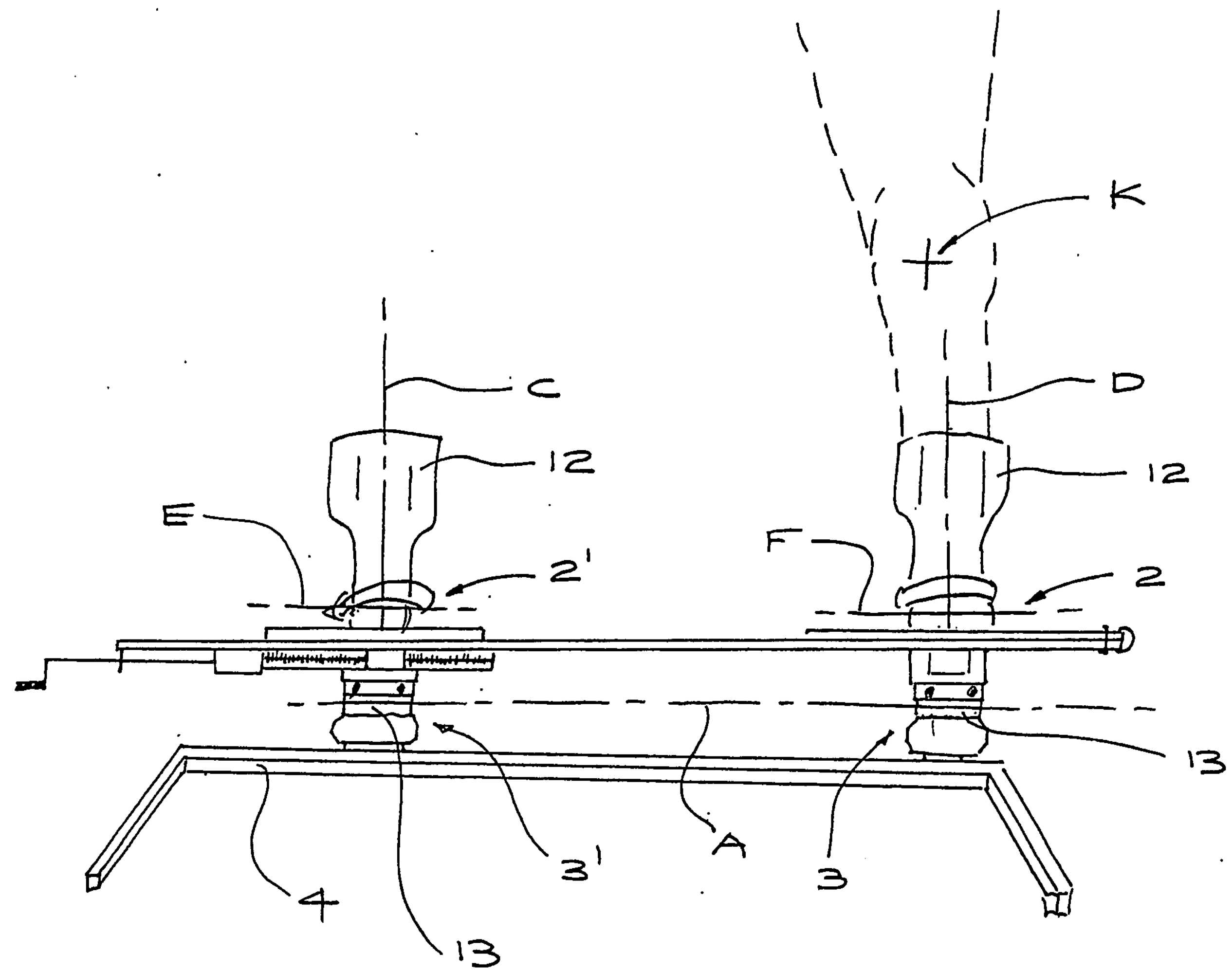

FIG. 2

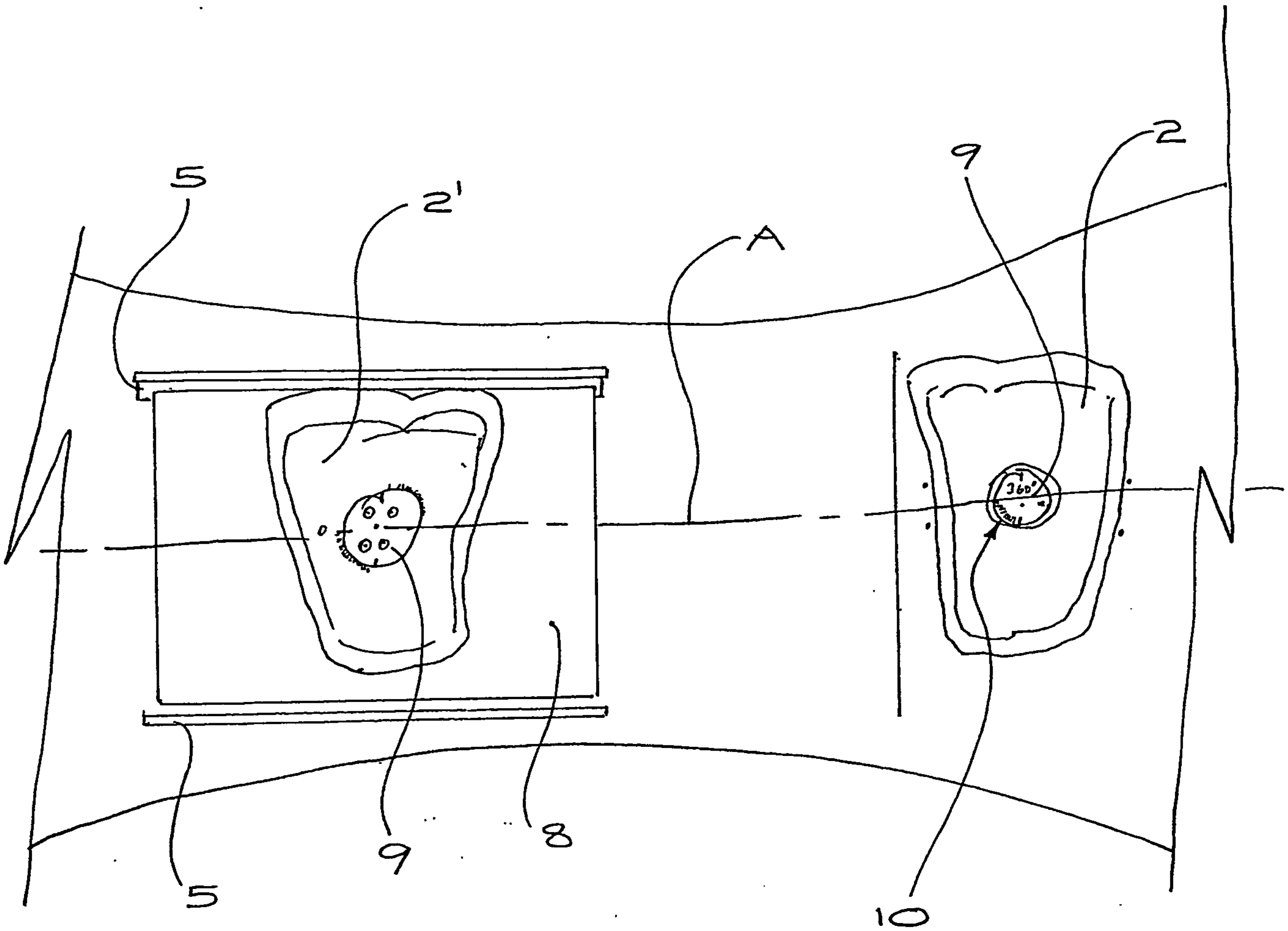

FIG. 3